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# Consciousness and the Cognitive Revolution: A True Worldview Paradigm Shift

Roger W. Sperry and Polly Henninger
Division of Biology 156-29
California Institute of Technology
Pasadena, CA 91125

## Abstract

Traditional scientific views of the conscious self and world we live in are challenged by an unprecedented outburst of emerging new paradigms, theories of consciousness, perceptions of reality, new sciences, new philosophies, epistemologies, and a host of other transformative approaches. This still expanding outburst can be traced, on both logical and chronologic grounds, not to chaos theory, ecology, the new physics, or dozens of other currently ascribed sources, but rather to the cognitive (consciousness) revolution that immediately preceded. These new approaches all share one key feature in common, namely, they all depend, directly or indirectly, upon a refutation and successful overthrow of the long dominant materialist paradigm. This is what was required to shift consciousness from an acausal or "eliminable" status to a functionally indispensable role. Traditional "bottom-up" micro-determinism had to be supplemented by a reciprocal, "top-down" control exerted by mental emergents over lower-level components. This does not dispose of behaviorism or reductionism, as methodology, but simply incorporates these within a more comprehensive explanatory framework. With the long reign of materialist constraints finally broken, other antireductive views have proliferated but with little regard for what the new paradigm allows.

The world, according to Dr. Sperry, will "little note nor long remember" anything we say here tonight, unless it should have a remedial impact on the state of our global resource-enviro-population predicament—say within 10 to 20 years. With this in mind we expand our present approach to consciousness to include some of the future-oriented implications. Among these we can see a plausible resolution to the many conflicting views that increasingly during the past two decades have challenged our traditional ways of thinking. New, "more holistic" paradigms, sciences, worldviews, and other related new outlooks have appeared in many areas from quantum physics and chaos theory to postmodern theology. Consciousness itself has suddenly been "rediscovered," "explained," "reconceived," given "new clothes," and so on. The outlook in science has been claimed to be more mystical, Eastern, re-enchanted, systems-oriented, eco-oriented, enculturated, and what not (e.g., Campbell 1974; Checkland 1981; Gleick 1987; Greenberg and Tobach 1988; Griffin 1981, 1988; Laszlo 1972; Stapp 1982; Toulmin 1982).

Among the consequences is a general widespread sense that we are today in a period of fundamental change. However, there is little certainty as to exactly what this change is, its basis, or what it really means for the future. Combined with our current "information explosion," the result has become a free-for-all unconstrained "opinion explosion," in which one can find today, for any side of any issue, excellent, persuasive, and seemingly authoritative backing—but with correspondingly different, and even opposing, futurist implications.

Our contention is that behind today's confusion of ideological cross-currents there lies a unifying, sound, science-based answer that contains reliable guidelines to a sustainable high-quality future. The answer is not found in quantum physics, chaos theory, eco-philosophy, or the many other sources now being acclaimed. Rather, we believe the answer lies in the mind-brain and behavioral sciences—more specifically in the so-called cognitive revolution of the 1970s, also referred to as the consciousness or mentalist revolution.

This turnabout in the conception and treatment of the conscious mind introduces novel principles of cognitive and subjective causation. These transform the scientific worldview. Described as "a virtual Copernican Revolution" (Manicas and Secord 1983) and a "Reenchantment of Science," among other things, our new outlook does not however—as frequently inferred—open the doors of science to the supernatural, the paranormal, the otherworldly—nor, in short, to any form of unembodied mind or spirit. The strength and promise of the new macromental outlook is just the opposite, that is, in taking our ultimate values and guideline beliefs out of the realm of the supernatural and otherworldly uncertainties and basing them on more realistic grounds, consistent with science and empiric verification (Sperry 1991).

In this view, science has undergone, over the past two and a half decades, a major corrective transformation to a more complete and comprehensive paradigm for causal explanation. In a time when it has become common to observe that there are almost as many theories of consciousness as people writing on the subject, it is important to note that the interpretation defended here is based on the mainstream working conceptual framework, over the past twenty years, for a whole discipline of science that specializes in mind and behavior (Sperry 1983). We thus deal with the factual recorded history of a paradigm shift where the leading question is, "What actually happened in psychology to cause

the 1970s' shift from behaviorism to mentalism?"

Accordingly, concentrating on psychology, we bypass the new physics, Bell's theorem and nonlocality (Klotz 1988), and also ecologic interconnectedness, Whiteheadian process philosophy, and various other things to which today's new outlook has also been ascribed. These include general systems theory, information theory, philosophic realism, structuralism, computer science, and nonlinear dynamics—to mention just some of the other alleged sources.

While many of these undoubtedly helped contribute in various secondary, supportive, reinforcing, and/or sociologic roles the critical key breakthrough factor, in this analysis was the overthrow of the centuries-old reasoning that seemed to rule out any causal role for mind or consciousness. This apparently closed, complete, and coherent system appeared to leave no place for conscious or mental forces. Their inclusion, moreover, would seemingly have to violate the conservation of energy and other established physical laws in which "mind does not move matter," "mental states cannot interact with physical states," or "no physical action waits on anything but another physical action."

Nevertheless, in the early 1970s conscious subjective states quite suddenly, almost explosively (Pylyshyn 1973), gained mainstream acceptance. The achievement of this long-delayed breakthrough came about only after we were prompted by some split-brain findings of the Fifties and Sixties to rethink the mind-brain relation (Sperry 1961, 1970a, 1974). We found that the normally unified mind could be surgically bisected into separate left and right minds. Further, the separate "Mind-Right" and "Mind-Left" could each simultaneously have different (even mutually incompatible) perceptions, thoughts and intentions. It was in this and in other respects that we were forced to think about the conscious mind in new and different ways. Meantime claims arose by Drs. Joseph Bogen (1986), Roland Puccetti (1977, 1981) and others contending that in the intact brain as well, each hemisphere contains a separate conscious self of its own. Thus each of us is said to have, in reality, not one but two conscious selves. We found a satisfying answer to such claims by invoking emergent downward control of the combined whole brain over the right and left halves.

This did not come easily back in the 1960s. It was necessary to break the hold of "bottom-up" thinking in which science had been locked for over two centuries. In the traditional atomistic or microdeterministic view of science, everything is determined from below upward following the course of evolution. Brain states determine mental states, but not vice-versa. In the new view, however, things are determined reciprocally, not only from lower levels upward, but also from above downward. Mental states determine brain states, as well as vice-versa. The traditional one-way "bottom-up" view, based in a heretofore supposedly closed, complete scheme for describing the entire natural order, was perceived to have a loophole or inadequacy in its one-way logic. This oversight allowed a place for the conception of conscious experience in a causal interactive role (Popper 1972; Sperry 1965).

By combining the old "bottom-up" atomistic determinism with an added concept of "top-down emergent determinism," a way was found at long last by which subjective causality might be included within the classic objective account of science. It follows accordingly that traditional scientific materialism has been in error all along. Not only mental but also all autonomous macro, emergent, or holistic causation have been logically excluded, reducing these to the basic forces of physics and eventually, in principle, to an even more elemental "theory of everything".

Mental states, as they successively emerge, for example in a train of thought, are conceived to interact functionally, as emergent wholes at their own cognitive level. These higher-level dynamics are presumed to be determined by emergent network properties interacting as irreducible entities, and *as subjectively experienced.* Such a sequence of higher-level cognitive dynamics exerts concomitant downward control over its neurocellular, molecular, atomic, subatomic and all other embedded and enveloped constituents. This is effected relative to things outside the system and thus without disrupting the laws of microchain causation within the embedded lower-level components.

At the same time, as conventionally assumed, the higher-level mental dynamics are also determined reciprocally by their lower-level neurocellular, biophysical, and other components. Subjective meaning is acquired on the so-called functionalist principles of modern computational philosophy. Our current macromental model is actually a *micro*, plus *macro*, plus *mental* model in which emphasis is given to the new *macro and mental* features. The mental is only an instance of the macro—but of sufficient significance to warrant special mention (Sperry in press).

It is important to note further that neither of the reciprocal upward and downward systems of causal control are of the common single-level, sequential type of causation ordinarily thought of as a cause-effect sequence. Both are exerted continuously and concomitantly over time. Furthermore these interlevel upward and downward forms of determinism are not symmetric, but quite different in kind. Thus the two counter-flow control systems do not collide, conflict, or in any way counteract each other. As indicated above, a relativity factor also is involved. The downward influence of the mental on the lower-level constituents is not evident from within the given cognitive brain process where the known laws of neuroscience still apply.

The downward control concept has been simply illustrated in what has been called the rolling wheel analogy, in which a wheel rolling downhill can been seen to carry along its parts "regardless of whether the individual molecules and atoms happen to like it or not" (Sperry 1969b). Within the wheel each molecule is governed in the usual physiochemical manner relative to neighboring events. Relative to the rest of the world, however, the space-time course of each molecule is determined most prominently by the macro properties of the wheel as a whole. The inclusion of both frames of reference for describing causation takes us

from the former incomplete reductionist paradigm to the more complete emergent interactionist interpretation.

The new model involves an added emphasis on the *space-time or pattern* factors in causation. Neither mass nor energy, as in information theory, these critical pattern factors have causal efficacy. The spatiotemporal arrangement of physical masses, particles, forces, fields, and so on are not accountable in terms of available lower-level laws. These space-time relationships are typically far too complex (over and above those of the 3-body problem) to be explainable by, or reducible to, existing laws for the lower level interactions.

To further distinguish the interpretation supported here, it will help to extend the historical background to include firstly the strong upswell of reductive physicalist thinking that occurred in the 1960s, and described by philosopher Thomas Nagel (1971) as a "wave of reductionist euphoria," and secondly the opposing wave of holism, emergence and "irreducibility" (e.g., Bertalanffy 1968; Koestler and Smythies 1969; Laszlo 1972; Pattee 1973; Polyani 1968; Popper 1972) which has since continued to burgeon into an extreme new high both within and outside science (Griffin 1988; Harris 1991).

This latest mainstream swing from one extreme to the other, rather abrupt in terms of historical precedents, poses another key question, "What was it that broke the 1960s' wave of extreme reductionism and turned it around into a new extreme all-time high for holism?" Also, in this same period what prompted the rise of "The New Philosophy of Science" (Manicas and Secord 1983)? The logical answer, we believe, is found in the same conceptual developments that enabled the revolutionary turnabout in our treatment of consciousness.

The five year period starting from about the mid-1960s, becomes, in this analysis, a crucial turning point in the history of both the reductionist debate and also that of the mind-body relation. Secondarily, it also will be seen that this same period becomes a turning point as well for the fact-value or science-values dichotomy (Edel 1980), and also for the ancient paradox of freewill and determinism (Deci 1980). All these collective changes derive, in our present view, from the cognitive revolution and its new two-way form of causal determinism. It was this also that set the stage for the subsequent rush of epistemic outbursts of the 1970s and '80s.

In our interpretation, the current swing from reductionism to holism has much in common with the concomitant swing from behaviorism to mentalism. Both shifts are interrelated, both dependent upon the new model of causality which includes "top-down" emergent determinism. The same modified concept that placed mental states in a causal role, also refuted the adequacy of traditional "bottom-up" physicalism and gave emergent macro qualities in general (including the mental) a new irreducible causal status. A "flow of history" or contextual analysis accounts as well for the broad array of new epistemologic trends of the past two decades. All of these appear to be dependent on a successful refutation of traditional materialist logic.

This brings us to another critical point in the argument, namely, its dependence upon an assumption that the 1970s' changeover in mainstream psychology from behaviorism to cognitivism, and Sperry's own similar shift to mentalism (Sperry 1964), were both effected on the same theoretic basis, that is, on the same shift to the same new mentalist paradigm. Support for this is twofold: Firstly, it hardly seems plausible that the powerful, seemingly incontestable physicalist paradigm of science with its rigorous exclusion of mentalistic explanation could suddenly, after having successfully fended off all challenges for centuries, have been toppled twice within the same few years by *two different* mentalist theories. This alone appears to justify the assumption that in both cases the rational basis for the new mentalist thinking has to be, in essence, one and the same. This assumption gains added support from the historical record and chronologic correlation in which the disciplinary turnaround in psychology followed closely on the early expressions of the new mentalism. Psychology's swing to mentalistic explanation came with a surprising suddenness (Pylyshyn 1973), for reasons not clear at the time and still subject to ongoing controversy (Boneau 1992; Puente and Griffith, in preparation).

When mind is merged with matter do we call it materialism, or mentalism, dualism, or monism, or what? The modified concept of mental states in a causal interactive role was classified by Karl Popper (1972), and by many others since, as a "dualistic" solution. In contrast, however, it has been described from the start by Sperry (1965) as a quite different intermediate position which is monistic, not dualistic. In his view, mental phenomena are inextricably interfused with their physiologic substrates. Nevertheless, mental states are distinguishable from the brain substrate in the way that an emergent property is distinguished from its infrastructure.

Though not as yet observable or measurable, mental states are presumed to be accessible in principle, to eventual scientific description (Sperry 1969a) with further advances in technology. It thus becomes a moot question as to whether this modified concept of a mental state retaining its subjective quality or raw feel, should now be called a material or a mental process. Either way, science gets a coherent hierarchic view which includes the mental emergents of the brain-mind system as part of a monistic natural order. Given this, do we continue to recognize the traditional difference between the physical and the mental (as subjectively perceived)? Questions and opinions are frequently raised as to whether this type of mind-brain solution ought to be called materialistic or *mentalistic*.

About ten years after Popper and Sperry had separately described this new solution to the mind-brain problem (Popper 1972; Sperry 1965), and some four years after its adoption by mainstream psychology (Dember 1974; Matson 1971; Palermo 1971), the same solution was rediscovered by philosopher Mario Bunge (1977, 1980), but renamed as a new "emergentist materialism"—with Sperry misclassified as a dualist, and psychology's shift to cognitivism not mentioned. This ongoing controversy over terminology has

caused puzzlement and confusion from the start (Bindra 1970; Sperry 1970b). Psychologist Thomas Natsoulas (1987), specializing in the history of consciousness, correctly points out that the new answer blends together features from previously opposed theories, and then, in reaction to its misclassification as dualism, calls it a type of physical monism. Certainly Bunge's materialism and Natsoulas' physicalism find more ready acceptance in modern science and philosophy than does mentalism. Accordingly, in retrospect, Sperry conjectures that it might have been wiser had he used an emergent materialist/physicalist label from the beginning.

However, it still seems a mistake overall to abandon the age-old commonsense distinction between mind and matter which long preceded the philosophic and scientific terminology. The highly distinctive specialness of conscious states with their subjective qualities does not go away just because they are taken to be emergent properties of physical brain processes.

## Notes

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